

**A NEW GENUS AND A NEW SPECIES OF LACCOPHILINE WATER
BEETLE FROM ECUADOR (COLEOPTERA: DYTISCIDAE)**

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The predaceous diving beetles (Coleoptera: Dytiscidae) of the subfamily Laccophilinae are a large and widespread group with 9 genera presently recognized. Most of the species belong to the cosmopolitan genus *Laccophilus* Leach (1817). Species of *Neptosternus* Sharp (1882) are known from the Old World tropics. The other genera have a more limited distribution and are represented by few species: *Laccodytes* Régimbart (1895) is neotropical, *Philaccolus* Guignot (1937), *Philodytes* J. Balfour-Browne (1939b), and *Africophilus* Guignot (1947) are African, *Laccoporus* J. Balfour-Browne (1939a) is known only from Tibet, and *Australphilus* Watts (1978) is found in Australia and Tasmania. The new genus described in this paper is represented by a single new species from the eastern foothills of the Andes Mountains in Ecuador.

Napodytes, new genus

Form oval, somewhat flattened, more convex dorsally than ventrally; outer margin of head, pronotum and elytra forming a continuous smooth outline; surfaces smooth and polished (Fig. 1).

Head broad, evenly rounded dorsally; eyes rounded except for straight posterior side, not protuberant. Clypeus broadly, shallowly emarginate. Labrum broad, evenly rounded on each side of a deep, rounded, median emargination. Antennae with segments 1 and 2 not much thicker than segments 3 and 4, cylindrical; segments 5-10 enlarged and flattened in male, smaller, cylindrical in female. Segment 11 elongate, pointed, with anterior side nearly straight, posterior side curved. Maxillary and labial palpi similar in form, with apical segments shaped like those of antennae.

Pronotum broad, 2.5 times as wide as long, widest at base, narrowing to width of head anteriorly; anterior margin straight, with a rounded emargination behind eyes; posterior margin obtusely angulate at middle, narrowly arcuate to sides; lateral margins finely beaded. Prosternum sharply carinate from base to apex of prosternal process; process narrowed between front coxae, abruptly widening to a rhomboid apex, with pointed tip fitting into a V-shaped notch in metasternum (Fig. 2A). Scutellum hidden.

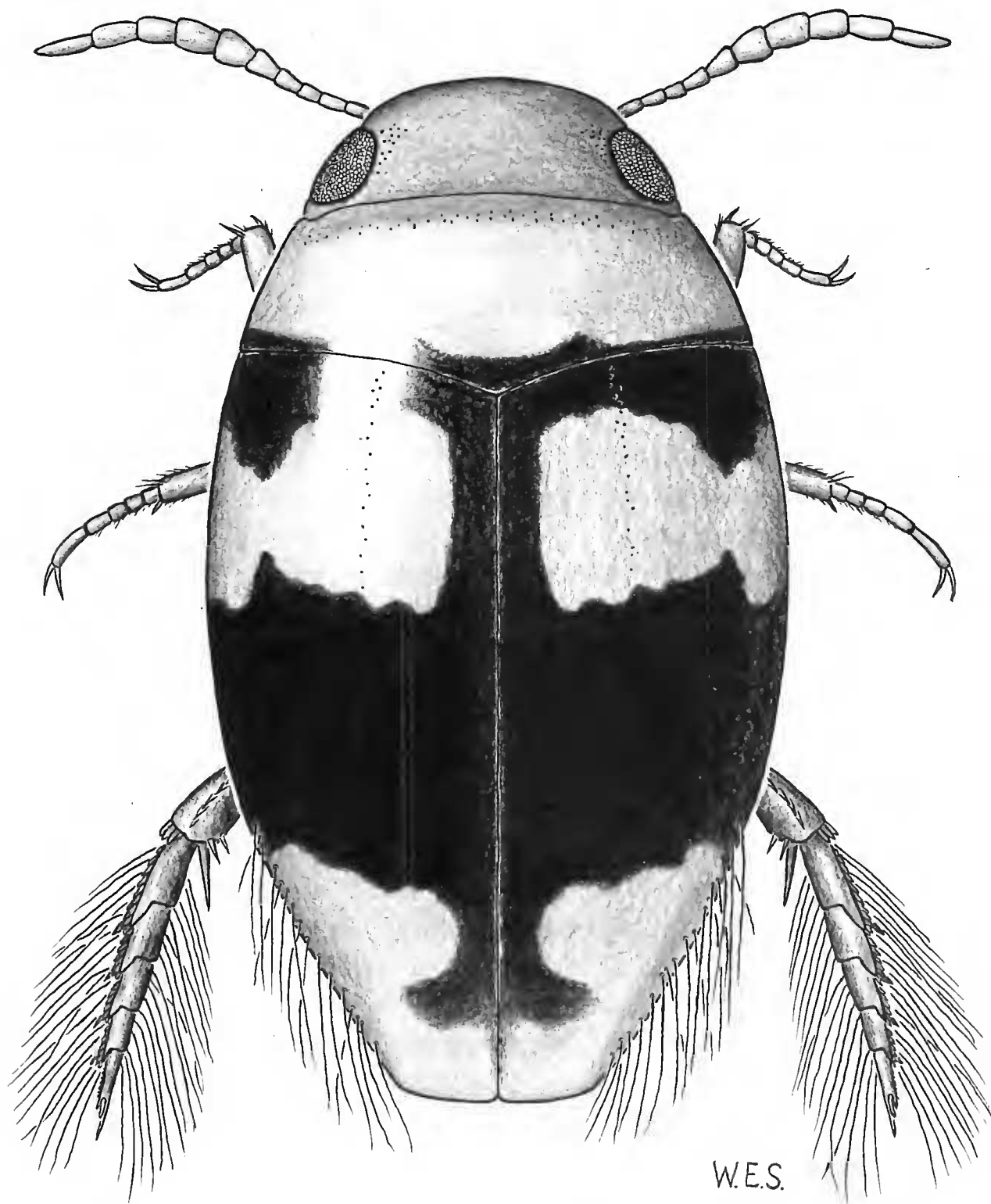


Fig. 1. *Napodytes boki*, male, dorsal habitus. Total length 1.8 mm.

Elytra widest at basal $\frac{1}{3}$, more than twice as long as wide, narrowly and obliquely truncate at apex; lateral margins finely beaded, with an irregular row of long, fine setae along apical $\frac{1}{3}$ of elytra; epipleura gradually tapering from base, extending nearly to outer corner of truncation. Episterna of metathorax not reaching mesocoxae (separated by mesepimera). Metasternum with a small, polished, median elevation at posterior apex. Metacoxal lines widely separated, gradually diverging posteriorly to metacoxal pro-

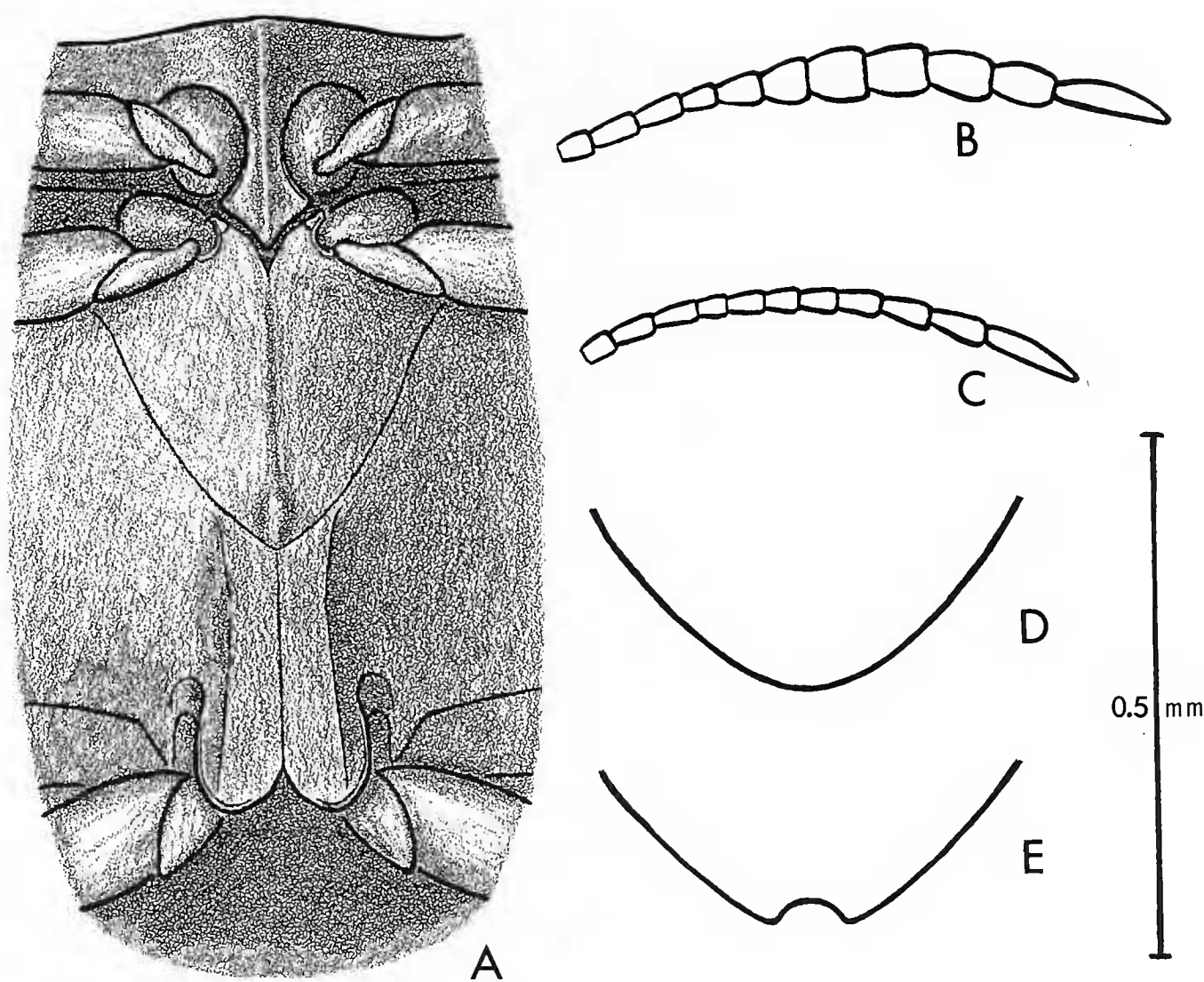


Fig. 2. *Napodytes boki*. A, Area of sternum showing prosternal process, metasternum, and metacoxal lobes. B, Antenna, male. C, Antenna, female. D, Apex of abdomen, male. E, Apex of abdomen, female.

cesses. Metacoxal processes rounded, separated by a narrow V-shaped cleft (Fig. 2A). Metasternal side wings strongly arcuate, evenly, narrowly tapered to a point. Abdominal sterna each with a transverse row of setigerous punctures; apex of last visible sternum entire and evenly rounded in male, emarginate in female.

Front and middle femora somewhat flattened, not setose. Front femora with a comb of stiff, posteriorly curved setae along apical $\frac{1}{3}$ of front ventral margin (well-developed in male, less so in female). Front and middle tarsi long, slender; segments 1–3 short, roughly equal in size, as long as wide; 4th segment longer; 5th segment very long, as long as the 2 preceding segments combined; segments 1–3 ventrally with narrow pads of adhesive hairs in male, a few short, stout setae in female; segments not dilated or thicker in male; claws equal, slender. Hind femora oblong, flattened. Hind tibiae short, robust, with a single, large, sharply pointed apical spur (Figs. 3A, B). Hind tarsal segments 1–4 with prominent ventrolateral lobes roughly $\frac{1}{3}$ as

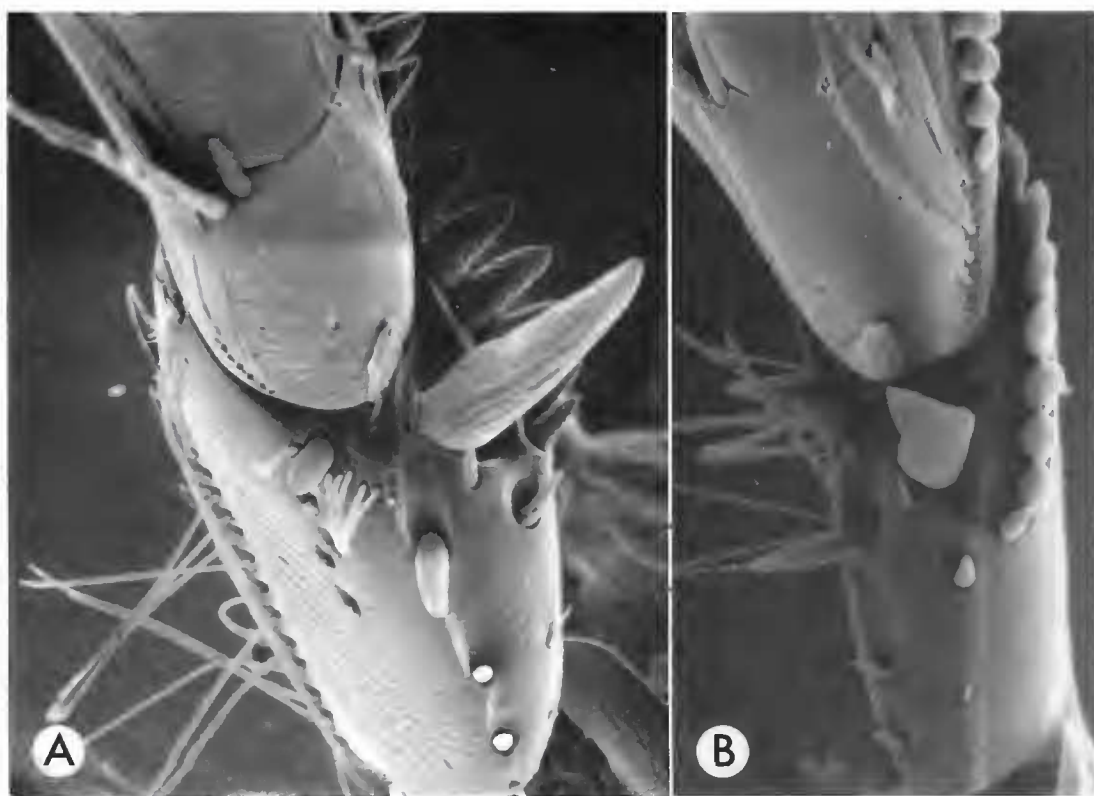


Fig. 3. *Napodytes boki* (allotype, ♀), right hind tibia, apex. A, Oblique view of apical spur. B, Direct view of apical spur. $\times 400$.

long as the segments; outer edge of each segment and lobe armed with a long ventral spur and an outer row of 7–10 stout spines; natatory hairs long and fine. Apical segment small, narrow, prolonged apically to a sharp spine; lateral lobe and spines reduced; a single, inconspicuous, flattened claw present between apical spine and lobe, lying along inner side of spine, about $\frac{1}{2}$ as long as spine.

Male genitalia with median lobe asymmetrical, bladelike; parameres asymmetrical, thin, leaflike, nearly straight on ventral side, widely rounded dorsally; left paramere with a single apical seta; right paramere with 2 apical setae. Female genitalia knifelike, with fused second valvulae (ovipositor) serrated ventrally, resting between long, curved, laterally flattened first valvulae.

Type species.—*Napodytes boki*, new species.

Etymology.—The name of the genus is derived from *Napo*, the name of the major river in eastern Ecuador and the province where the type-species was collected, and *dytes* (Greek), “diver,” a component of many of the generic names in the family. The gender is masculine.

***Napodytes boki*, new species**

Length 1.8 mm; greatest width 1.0 mm; greatest thickness 0.6 mm. Head light brownish yellow; dorsal surface shining, polished, with a small, faintly

punctate area above each eye. Eyes narrowly ringed with black. Pronotum mostly yellow, brownish yellow anteriorly, with dark brown to black coloration along posterior margin; surface polished, with a narrow band of very fine, inconspicuous punctures behind anterior margin. Elytra black with undulate yellow patches, as illustrated (Fig. 1); surfaces shining, very finely, faintly reticulate, with a row of small punctures down basal $\frac{1}{3}$ of disc. Appendages, epipleura, and ventral surfaces of head, prothorax, and abdomen yellowish; metathorax and metacoxal plates darker, brownish.

Antennae of male (Fig. 2B) with segments 5–10 flattened, more rounded and expanded anteriorly than posteriorly, convex dorsally, slightly concave ventrally; segment 7 widest, nearly as wide as long; segments 8–11 successively narrower and longer; segment 11 nearly 4 times as long as wide. Antennae of female (Fig. 2C) not modified, with most segments roughly twice as long as wide, only slightly flattened; segments 3–10 successively widening gradually (10th segment widest); segment 11 like that of male, but smaller.

Ventral surfaces of body shining, very finely reticulate. Abdominal sterna not as smoothly polished as metasternal and metacoxal plates. Last visible abdominal sternum (Figs. 2D, E) in female with emargination small, semi-circular, with apical corners narrowly rounded.

In male profemoral comb of 4 enlarged, rigid setae proximally, several very small, fine setae distally; first (proximal) seta largest; comb reduced in female, with only 3 small setae visible.

Male genitalia (Figs. 4A–D) with median lobe slender, arched dorsally, with apex flattened and knifelike, twisted from axis of base like a blade of a propeller; left side of blade with edge thin and sharp, with a very thin flange expanded outward at base (midlength of median lobe); right side thick and rounded in cross section, narrowly sinuate along length of median lobe in dorsal view, angled to form a broadly, obliquely truncate apex; tip narrowly rounded. Left paramere twisted, narrower than right paramere, with a single, long, stiff, apical seta. Right paramere broad, cupped around base of median lobe, with 2 long apical setae.

Female genitalia (Figs. 4E, F) with ovipositor long and slender, heavily sclerotized, with a row of fine, closely spaced teeth along each side of a median ventral groove from base to apical $\frac{1}{5}$, where rows merge into a single row of 4 very large, flattened, triangular teeth. Outer (1st) valvulae long and gradually curved upward to a sharp apex, with a second subapical point on dorsal edge; valvulae connected at a small dorsal swelling just beyond midlength.

Types.—Holotype ♂, and allotype: ECUADOR: Napo, 17 km. SW Tena, 28 May 1977 (W. E. Steiner). The types are deposited in the U.S. National Museum of Natural History, Smithsonian Institution, Washington, D.C.; USNM type no. 76602.

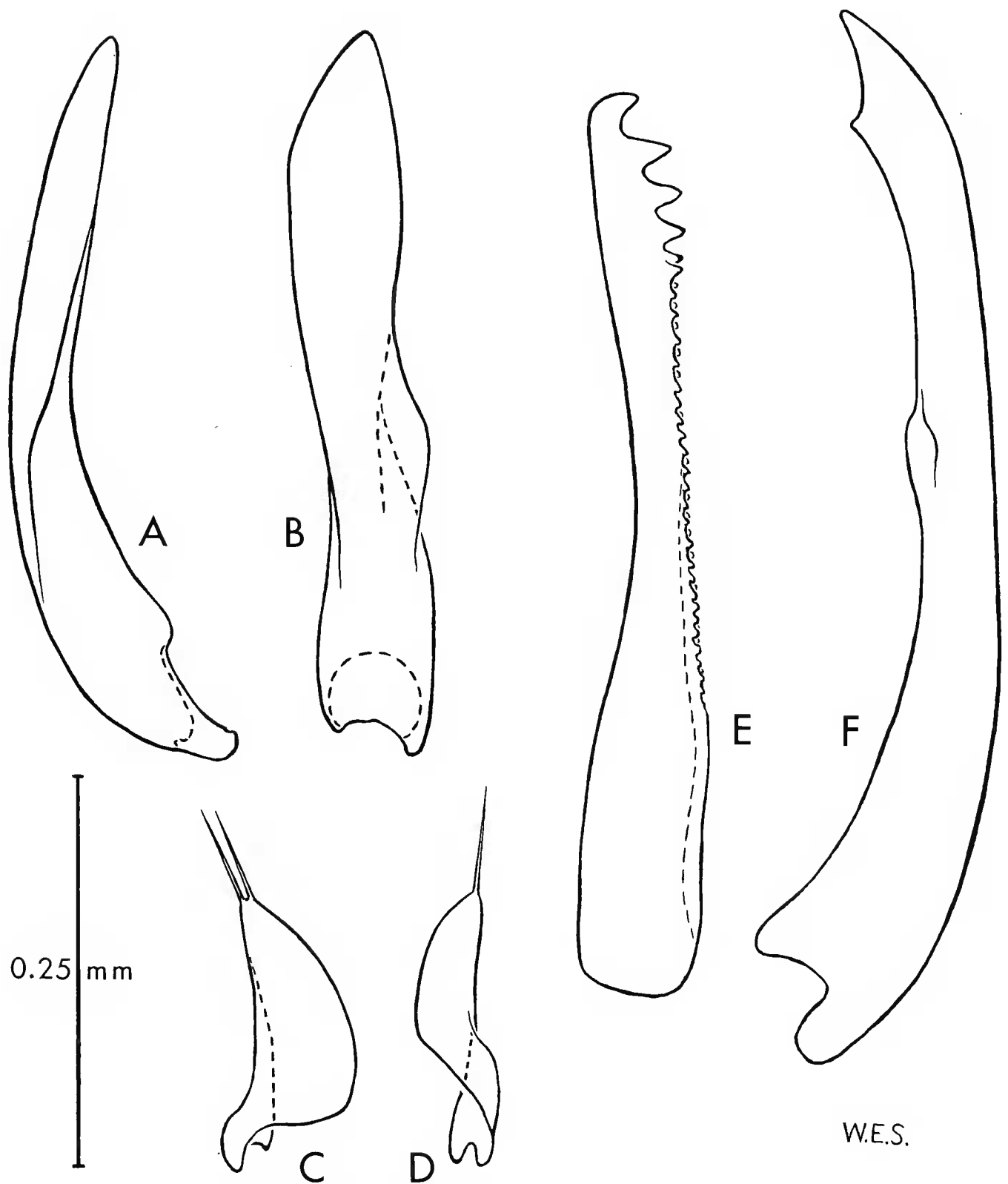


Fig. 4. *Napodytes boki*, male and female genitalia. A, Median lobe, lateral view. B, Median lobe, dorsal view. C, Right paramere, lateral view. D, Left paramere, lateral view. E, Ovipositor, lateral view. F, First valvula, lateral view.

Etymology.—It gives me great pleasure to name this species in honor of Gordon Bok, folklore artist from Maine, who has given us many inspiring songs and stories of the water and the life so dependent on it.

Known distribution.—The species is known only from the 2 specimens from the type-locality.

Biotope at the type-locality.—The specimens of *Napodytes boki* were collected at a blacklight shortly after dark during a light rain. The light was operated in an open roadside clearing near a swift, rocky creek. Steep hills of montane rain forest surrounded the site. Elevation approximately 660 m; temperature about 23°C.

The specific microhabitat of *Napodytes boki* cannot be determined; in addition to the stream, other nearby aquatic habitats included shaded seepages, small creeks, roadside puddles, and water in epiphytic plants. Members of other laccophiline genera are known to be associated with a variety of temporary lentic habitats and margins of small streams.

Behavior.—When collected from the sheet beneath the blacklight, the beetles were observed jumping actively in various unexpected directions. This evasive behavior is seen in other laccophilines when out of water and disturbed, and seems to be characteristic of the group. It has been described as a method of escape in *Africophilus* species (Omer-Cooper, 1965).

Discussion

The genus *Napodytes* is placed in the subfamily Laccophilinae because of the separation between the metepisterna and mesocoxae, hidden scutellum, single hind tarsal claws, smoothly oval body outline, and serrate ovipositor. The small size, form of the prosternal process, and emarginate abdominal apex in the female are characters shared by the members of the genus *Laccodytes*. These apotypic features are not seen in the other known laccophiline genera, suggesting that *Napodytes* and *Laccodytes* are closely related sister groups.

The single apical spur of the hind tibia in *Napodytes boki* is, however, a unique and unusual character among the Dytiscidae. Members of other known laccophiline genera have two large spurs arising from the excavated apex of the tibia: a longer dorsal (posterior) spur and a shorter but equally strong ventral (anterior) spur, with bases contiguous. In *Napodytes boki* the single spur arises medially, and no trace of a second spur is evident, as illustrated by the scanning electron micrographs (Figs. 3A, B). The setae and small, peglike spurs surrounding the smooth apical excavation are not homologous with the second large spur; these small ones are also present and arranged similarly in other laccophilines with two normal spurs. The single spur in *Napodytes* is probably the result of an evolutionary loss of one of the spurs, or a fusion of the two.

The modified antenna in the male of *Napodytes boki* is also an unusual feature not previously known in the Laccophilinae. Régimbart's (1895) two species of *Laccodytes* (including the type-species, *phalacroides*) were described from females only, but both sexes of *Laccodytes americanus* Peschet (1919) are known and have antennae simple, not sexually dimorphic.

The following key will serve to identify the genera recognized at present. Key characters were taken from the descriptions and other keys in regional studies (Balfour-Browne, 1939; Omer-Cooper, 1965). I have not seen examples of all of the genera.

Key to the Known Genera of Laccophilinae of the World

1. Hind tibiae with a single large apical spur; antennal segments enlarged and flattened in male *Napodytes*
 Hind tibiae with 2 large subequal apical spurs; antennae not noticeably different between sexes, filiform 2
2. Prosternal process trifurcate, with 3 long sharply pointed spines directed posteriorly; hind angles of pronotum spiniform *Neptosternus*
 Prosternal process variably lanceolate, with a single pointed apex; hind angles of pronotum squared or narrowly rounded, not spiniform 3
3. Hind tibial spurs bifurcate at apex *Laccophilus*
 Hind tibial spurs with a simple sharp apex 4
4. Size small, under 2.5 mm long; prosternal process widely broadened and angulate at sides behind front coxae, forming a diamond-shaped apex *Laccodytes*
 Size larger, over 2.5 mm long; prosternal process more narrowly lanceolate, not angulate behind front coxae 5
5. Base of pronotum angulate at middle, sinuate to sides 6
 Base of pronotum straight or broadly rounded across middle 7
6. Surfaces of legs densely punctate; prosternal process distinctly carinate *Laccoporus*
 Surfaces of legs smooth; prosternal process not strongly carinate *Philodytes*
7. Elytral reticulation irregular; metacoxal lines parallel anteriorly *Africophilus*
 Elytral reticulation transverse; metacoxal lines divergent anteriorly 8
8. Hind coxal processes bilobed; reticulation of metacoxal plate rounded *Australphilus*
 Hind coxal processes simple, rounded; reticulation of metacoxal plate transverse *Philaccolus*

The curious single spur of the hind tibia and obvious sexual dimorphism in the antennae of *Napodytes boki* are unique apotypic features among the Laccophilinae, and are the key characters separating *Napodytes* from the other genera in the group. The adaptive advantages of these modifications are uncertain; the presence of these characters and the relatively flattened body form suggests that the species may have an unusual aquatic niche and

microhabitat. These questions and the relationships among the genera may be worked out when the Neotropical fauna can be more thoroughly studied, and the larval stages and biologies are discovered.

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